

D_s production differential cross section

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Purpose and Goal

- To calculate the number of neutrinos passing through the emulsion target, the x_F and p_T dependence of the D_s production cross section is needed.

Differential cross section

- x_F is the longitudinal momentum fraction
 - particle momentum over maximum particle momentum
- p_T is the momentum perpendicular to the beam axis
- the cross section can be written as

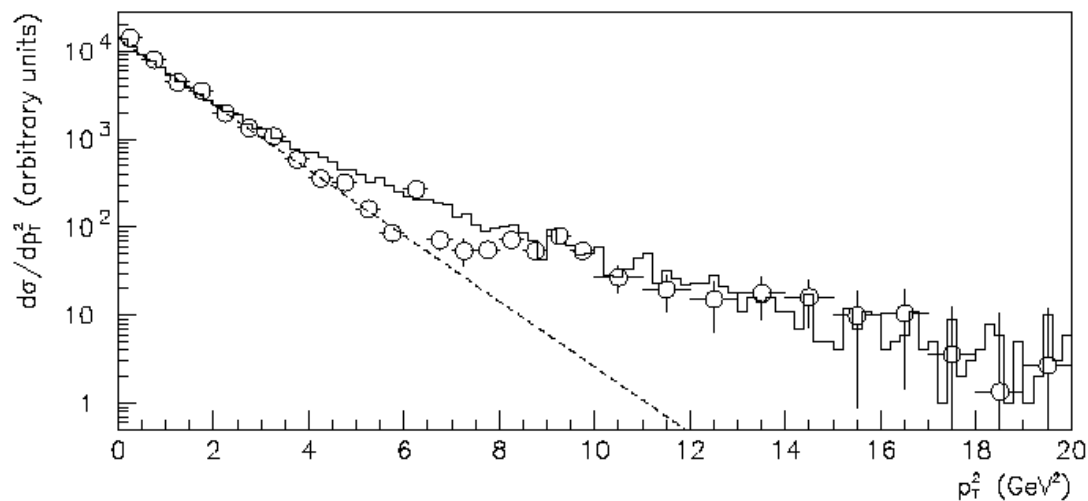
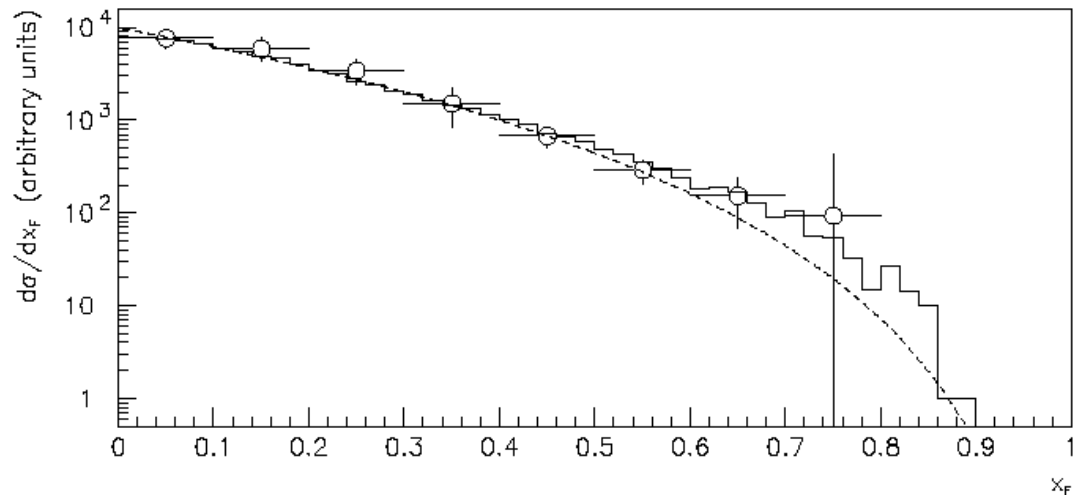
$$\frac{d^2\sigma}{dx_F dp_T^2} \propto e^{-bp_T^2} (1 - |x_F|)^n$$

- the parameters b and n are determined by experiments

Method

- The differential cross section has not been measured for D_s , but
 - it has been measured for D_{\pm} and D_0
 - QCD calculations can be used to predict the differential cross section for D_s (Pythia)
- compare proton and pion data
 - consistency check

x_F and p_T^2 distributions for 350GeV pions



Pythia

equation

- WA 92
(350GeV π^-)

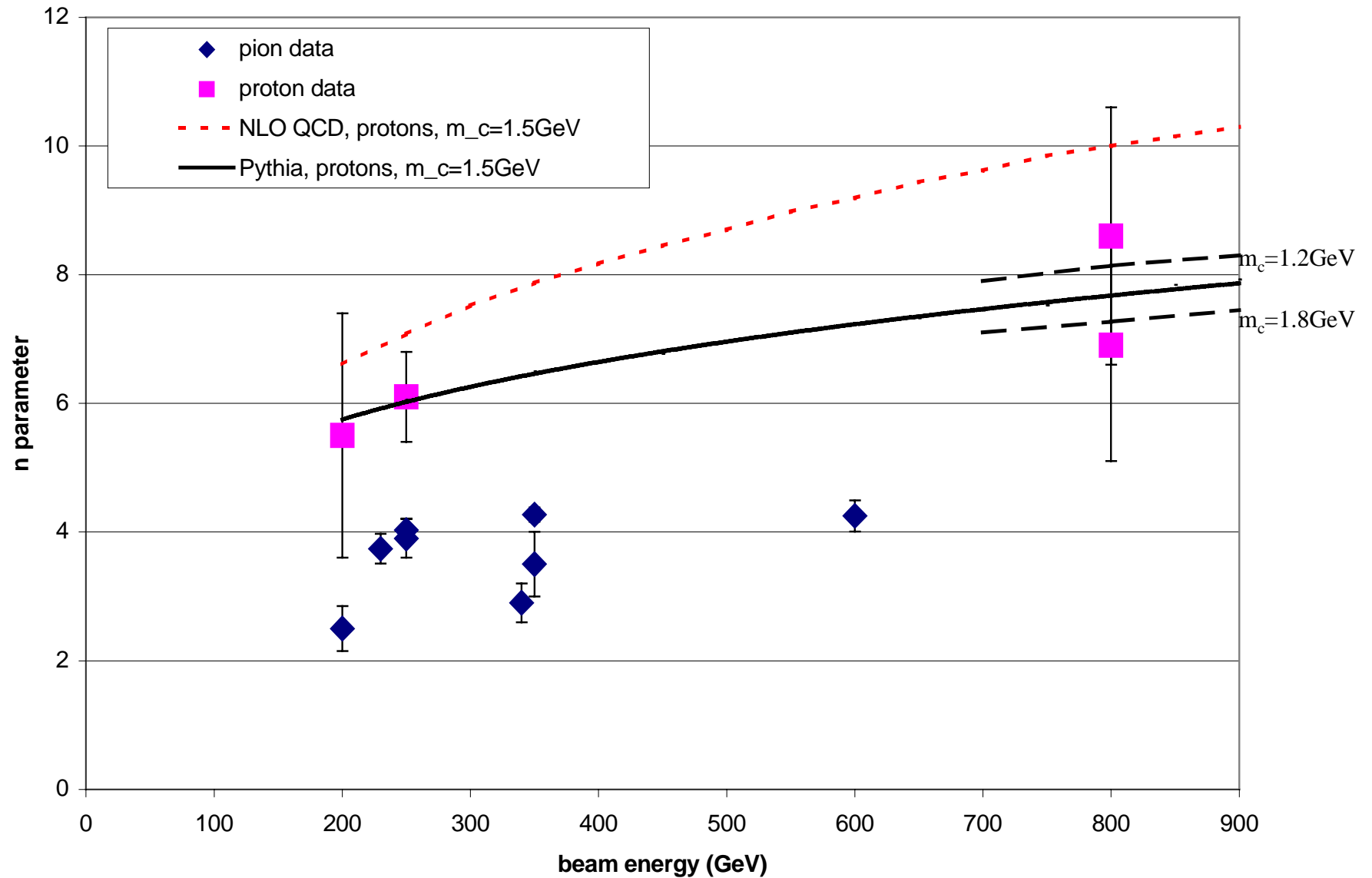
Comparison to predictions

- Next-to-leading-order QCD calculation
 - varying m_c
- Pythia
 - varying m_c
 - includes hadronization

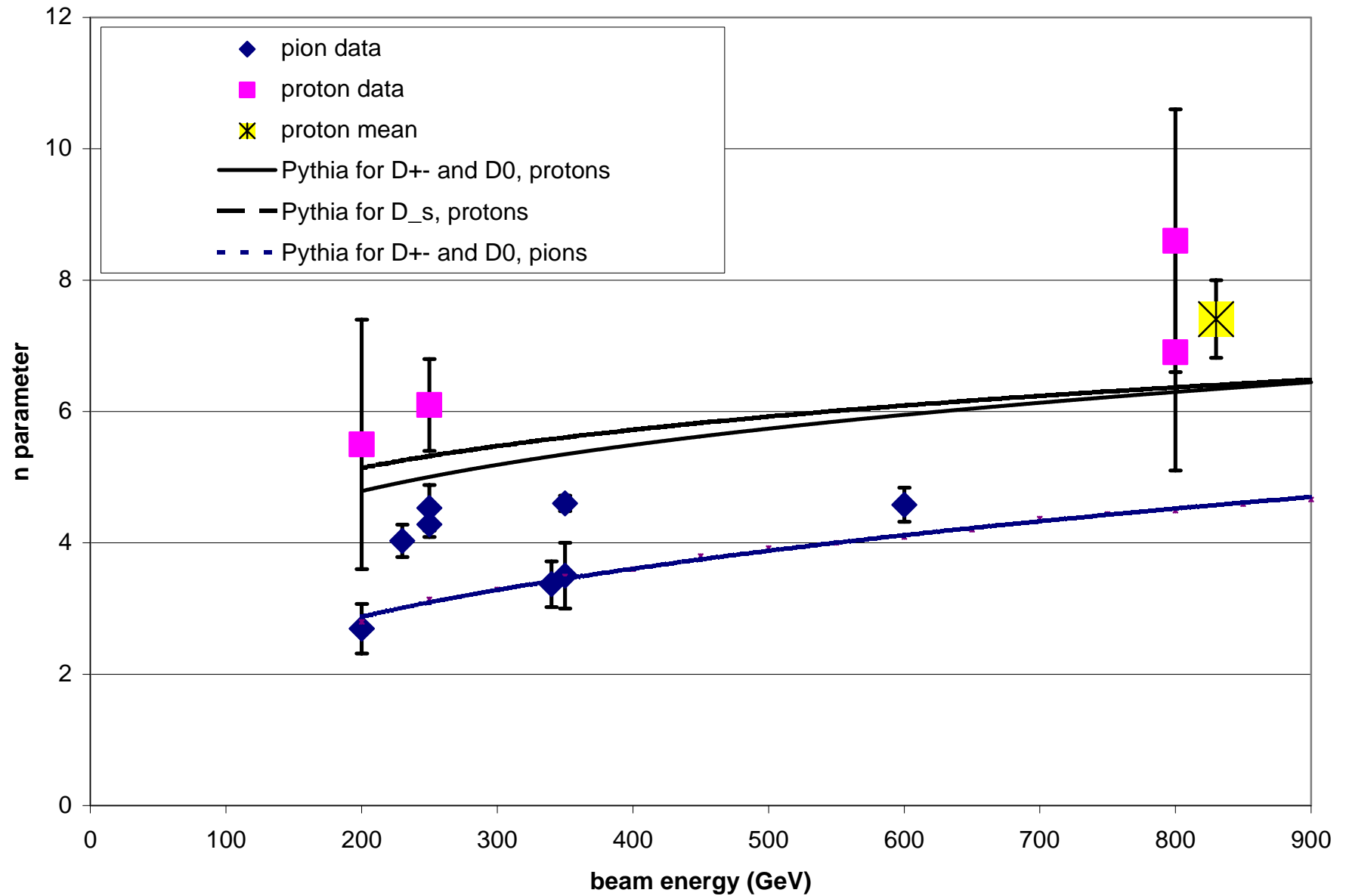
Corrections to data

- Adjust for different fit intervals
- to find the mean, shift to 800GeV

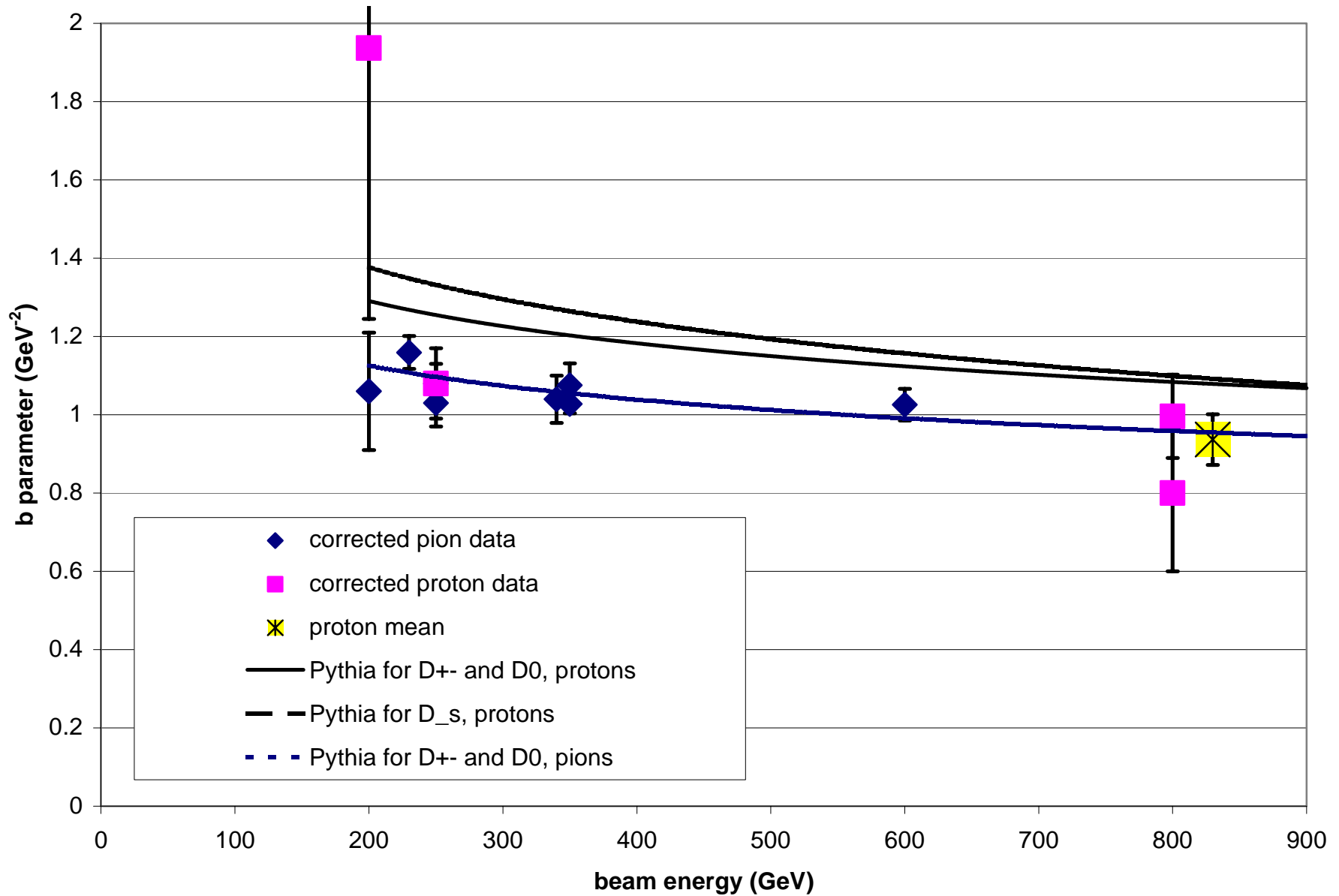
The n parameter



The n parameter for D production



The b parameter for D production



Results

- Once again, the parameters are well known for pion beams
- the exact value depends on the fit range
- NLO QCD and Pythia agree with data
- result for D_s production:
 - $n=(7.4\pm0.6)$
 - $b=(0.94 \pm 0.06)\text{GeV}^{-2}$
 - both are about the same as before but with smaller errors

Conclusion and Outlook

- The shape of the D differential cross section has been measured in several experiments
- it is understood
 - in theory and by experiments
 - for pion and proton beams
- I will study the effect on the neutrino yield